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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/586,712

07/20/2006

Masahiro Yasumi

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RATNERPRESTIA

P.O. BOX 980

VALLEY FORGE, PA 19482

EXAMINER

ROSENAU, DEREK JOHN

ART UNIT

PAPER NUMBER

2837

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PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

<b>Office Action Summary</b>	<b>Application No.</b> 10/586,712	<b>Applicant(s)</b> YASUMI ET AL.	
	<b>Examiner</b> Derek J. Rosenau	<b>Art Unit</b> 2837	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

#### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

- 1) ☒ Responsive to communication(s) filed on 15 June 2010.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

- 4) ☒ Claim(s) 1-3 and 11 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-3 and 11 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

#### Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

#### Attachment(s)

- |                                                                                                            |                                                                                         |
|------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)                                           | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftperson's Patent Drawing Review (PTO-948)                        | 5) <input type="checkbox"/> Notice of Informal Patent Application                       |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____                                                |

## **DETAILED ACTION**

### ***Continued Examination Under 37 CFR 1.114***

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 15 June 2010 has been entered.

### ***Claim Rejections - 35 USC § 103***

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. Claims 1-3 and 11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Fujii et al. (WO 2003/052840) in view of Watanabe et al. (US 6153898) and Shimada et al. (US 5802686).

4. With respect to claim 1, Fujii et al. discloses an angular velocity sensor (Fig 15) comprising: a substrate (item 500) made of single crystal silicon (Paragraph 217) and having a tuning fork shape (Fig 15), the substrate including a plurality of arms extending parallel with each other (Fig 15), the plurality of arms vibrating to operate (Paragraph 217), and a joint section for connecting respecting ends of the arms with each other (Fig 15); a first adhesion layer (Fig 1, item 12) provided on the substrate (Fig 1), the first adhesion layer containing titanium (Paragraph 71); a first electrode layer (item 503) provided on the first adhesion layer (Fig 16),

Art Unit: 2837

the first electrode containing platinum and at least one of titanium and titanium oxide (Paragraph 78); an orientation control layer (item 504) provided on the first electrode layer (Fig 16); a piezoelectric layer (item 505) containing PZT-crystal (Paragraph 2) provided on the orientation control layer (Fig 16); and a second electrode layer (item 506) provided on the piezoelectric layer (Fig 16).

Fujii et al. does not disclose expressly a barrier layer provided on each of the plurality of arms of the substrate, the barrier layer containing silicon oxide and having a thickness smaller than 0.5 micrometers; the first adhesion layer being provided on the barrier layer, or a second adhesion layer provided on the piezoelectric layer with the second electrode being formed on the second adhesion layer, or that the barrier layer prevents Si atoms from diffusing in the platinum of the first electrode layer, the orientation control layer and the PZT-crystal of the piezoelectric layer.

Watanabe et al. teaches a piezoelectric device including a barrier layer (item 12) provided on the substrate (Fig 1), the barrier layer containing silicon oxide (column 3, lines 51-60) and having a thickness smaller than 0.5 micrometers (column 6, lines 41-45); the adhesion layer (item 13) being formed on the barrier layer (Fig 1), and that the barrier layer prevents Si atoms from diffusing in the platinum of the first electrode layer and the PZT-crystal of the piezoelectric layer (column 3, lines 51-60). In combination with Fujii et al., the barrier layer also prevents diffusion of Si atoms in the orientation control layer of Fujii et al. (the diffusion-preventing barrier layer of Watanabe is placed directly on the silicon substrate and prevents diffusion of Si atoms to layers above the barrier layer, which in combination include the platinum electrode layer, the orientation control layer, and the PZT-crystal of the piezoelectric layer).

Shimada et al. teaches a piezoelectric device in which an adhesion layer is provided between the piezoelectric layer and the top electrode layer (column 7, lines 40-50); therefore, Shimada et al. discloses a second adhesion layer provided on a piezoelectric layer and a second electrode provided on the second adhesion layer.

At the time of invention, it would have been obvious to a person of ordinary skill in the art to combine the barrier layer of Watanabe et al. and the second adhesion layer of Shimada et al. with the angular velocity sensor of Fujii et al. for the benefits of preventing diffusion (column 3, lines 51-60 of Watanabe et al.) and to improve the bond between the piezoelectric layer and the top electrode (column 7, lines 40-50 of Shimada et al.).

5. With respect to claim 2, the combination of Fujii et al., Watanabe et al., and Shimada et al. discloses the angular velocity sensor of claim 1. Fujii et al. discloses that the orientation control layer comprises dielectric oxide material containing Pb and Ti (Paragraph 73).

6. With respect to claim 3, the combination of Fujii et al., Watanabe et al., and Shimada et al. discloses the angular velocity sensor of claim 1. Fujii et al. discloses that the orientation control layer comprises lead titanate containing at least one of La and Mg (Paragraph 73).

7. With respect to claim 11, the combination of Fujii et al., Watanabe et al., and Shimada et al. discloses the angular velocity sensor of claim 1. Watanabe et al. discloses that the thickness of the barrier layer ranges from 20 nm to 300 nm (column 6, lines 42-45).

#### ***Response to Arguments***

8. Applicant's arguments filed 15 June 2010 have been fully considered but they are not persuasive.

Art Unit: 2837

9. Applicant argues that it would not be obvious to combine a diffusion preventing layer from a ferroelectric capacitor, such as that of Watanabe et al. with an angular velocity sensor, such as that of Fujii et al. However, an angular velocity is a ferroelectric capacitor. Therefore, although the ferroelectric capacitors of Fujii et al. and Watanabe et al., their structural similarities are such that it would be obvious to combine the diffusion-preventing barrier layer of Watanabe et al. with the angular velocity sensor of Fujii et al. In addition, Fujii et al. discloses that its teachings are applicable to ferroelectric capacitors (Fig 1), piezoelectric print head devices (Fig 4), and angular velocity sensors (Fig 15); therefore, based on the teachings of Fujii et al., it would be obvious to combine the teachings of a ferroelectric capacitor and an angular velocity sensor.

10. Applicant argues that it would not be obvious to combine the teachings from a piezoelectric print head device, such as Shimada et al., with the angular velocity sensor of Fujii et al. However, as described above, Fujii et al. discloses that its teachings are applicable to ferroelectric capacitors, print head devices, and angular velocity sensors. Therefore, it would be obvious to combine the teachings of Shimada et al. and Fujii et al.

11. Applicant argues that there would not be sufficient reason to combine the teachings of the references in the manner suggested in the office action. However the reasons were provided in the office action as “for the benefits of preventing diffusion (column 3, lines 51-60 of Watanabe et al.) and to improve the bond between the piezoelectric layer and the top electrode (column 7, lines 40-50 of Shimada et al.)”.

*Conclusion*

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Derek J. Rosenau whose telephone number is (571)272-8932. The examiner can normally be reached on Monday thru Thursday 7:00-5:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Walter Benson can be reached on (571) 272-2227. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Derek J Rosenau/  
Examiner, Art Unit 2837